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Permit Applicants' Guidance Manual for Exposure Information Requirements under RCRA (Resource Conservation and Recovery Act) Section 3019

(U.S.) Environmental Protection Agency
Washington, DC

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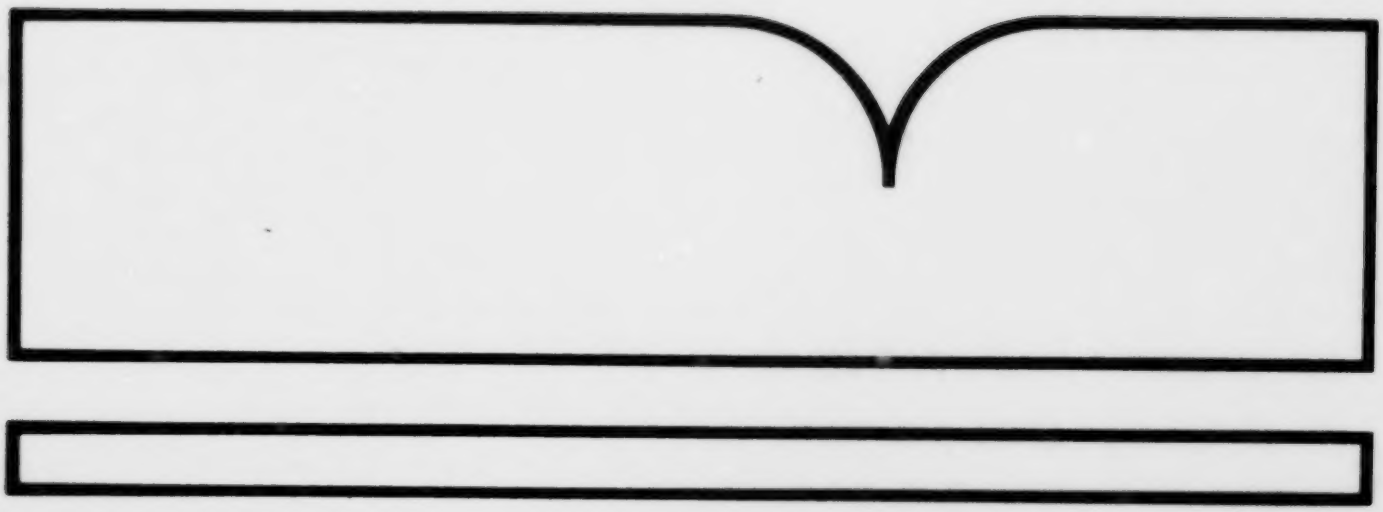

U.S. Department of Commerce
National Technical Information Service
NTIS

FIGURE 1.0 Resource Conservation and Recovery Act of 1976; Subtitle C - Hazardous Waste Management

Section 3019. Exposure Information and Health Assessments

"Sec. 3019. (a) EXPOSURE INFORMATION.—Beginning on the date nine months after the enactment of the Hazardous and Solid Waste Amendments of 1984, each application for a final determination regarding a permit under section 3005(c) for a landfill or surface impoundment shall be accompanied by information reasonably ascertainable by the owner or operator on the potential for the public to be exposed to hazardous wastes or hazardous constituents through releases related to the unit. At a minimum, such information must address:

"(1) reasonably forseeable potential releases from both normal operations and accidents at the unit, including releases associated with transportation to or from the unit;

"(2) the potential pathways of human exposure to hazardous wastes or constituents resulting from the releases described under paragraph (1); and,

"(3) the potential magnitude and nature of the human exposure resulting from such releases.

The owner or operator of a landfill or surface impoundment for which an application for such a final determination under section 3005(c) has been submitted prior to the date of enactment of the Hazardous and Solid Waste Amendments of 1984 shall submit the information required by this subsection to the Administrator (or the State, in the case of a State with an authorized program) no later than the date 9 months after such date of enactment.

"(b) HEALTH ASSESSMENTS.—

"(1) The Administrator (or the State, in the case of a State with an authorized program) shall make the information required by subsection (a), together with other relevant information, available to the Agency for Toxic Substances and Disease Registry established by section 104(i) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980.

"(2) Whenever in the judgment of the Administrator, or the State (in the case of a State with an authorized program), a landfill or a surface impoundment poses a substantial potential risk to human health, due to the existence of releases of hazardous constituents, the magnitude of contamination with hazardous constituents which may be the result of a release, or the magnitude of the population exposed to such release or contamination, the Administrator or the State (with the concurrence of the Administrator) may request the Administrator of the Agency for Toxic Substances and Disease Registry to conduct a health assessment in connection with such facility and take other appropriate action with respect to such risks as authorized by section 104(b) and (i) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980. If funds are provided in connection with such request the Administrator of such Agency shall conduct such health assessment.

"(c) MEMBERS OF THE PUBLIC.—Any member of the public may submit evidence of releases of or exposure to hazardous constituents from such a facility, or as to the risks or health effects associated with such releases or exposure, to the Administrator of the Agency for Toxic Substances and Disease Registry, the Administrator, or the State (in the case of a State with an authorized program).

"(d) PRIORITY.—In determining the order in which to conduct health assessments under this subsection, the Administrator of the Agency for Toxic Substances and Disease

FIGURE 1.0 (continued)

Registry shall give priority to those facilities or sites at where there is documented evidence of release of hazardous constituents, at which the potential risk to human health appears highest, and for which in the judgment of the Administrator of such Agency existing health assessment data is inadequate to assess the potential risk to human health as provided in subjsection (f).

"(e) PERIODIC REPORTS.—The Administrator of such Agency shall issue periodic reports which include the results of all the assessments carried out under this section. Such assessments or other activities shall be reported after appropriate peer review.

"(f) DEFINITION.—For the purposes of this section, the term 'health assessments' shall include preliminary assessments of the potential risk to human health posed by individual sites and facilities subject to this section, based on such factors as the nature and extent of contamination, the existence of potential for pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified contaminants and any available recommended exposure or tolerance limits for such contaminants, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The assessment shall include an evaluation of the risks to the potentially affected population from all sources of such contaminants, cinluding known point or nonpoint sources other than the site or facility in question. A purpose of such preliminary assessments shall be to help determine whether full-scale health or epidemiological studies and medical evaluations of exposed populations shall be undertaken.

"(g) COST RECOVERY.—In any case in which a health assessment performed under this section discloses the exposure of a population to the release of a hazardous substance, the costs of such health assessment may be recovered as a cost of response under section 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 from persons causing or contributing to such release of such hazardous substance or, in the case of multiple releases contributing to such exposure, to all such release.

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The purpose of this document is to provide owners and operators of hazardous waste landfills and surface impoundments that are subject to permitting under RCRA with guidance for submitting information on the potential for public exposure to hazardous wastes, as required by Section 3019 of RCRA.

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OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Distribution of the Permit Applicants' Guidance for Exposure Information Requirements

TO: Regional Hazardous Waste Management Division Directors, Regions I-X

FROM: John Skinner, Director
Office of Solid Waste

for Michael Block

Attached you will find the final version of the Permit Applicants' Guidance Manual for Exposure Information Under RCRA 3019 which has received final clearance from the Office of Management and Budget (OMB). Due to the fast approaching statutory deadline, I urge you to distribute copies of the Manual to all facilities that are applying for a RCRA Permit for a landfill or a surface impoundment as soon as possible. I suggest that a cover note be attached to the document highlighting the following points.

(1) The August 8, 1985 deadline for submission of the Exposure Information Report (EIR) applies to owners or operators of landfills and impoundments who already submitted RCRA Permit applications. Future applicants must submit the EIR at the same time as their Part B.

(2) Relevant exposure information already submitted in the Part B application need not be resubmitted in the EIR. However, a cross-reference for the location of the data in the Part B must be completed by the applicant (see Appendix A). In general, most of the additional information required should be readily obtained from existing records of the owner/operator, or from appropriate government agencies. Applicants must submit an explanation of why any missing information could not be obtained.

(3) Applicants who provide all of the information and the discussion described in the Manual will generally be considered to have met the Section 3019 information submittal requirements. Depending on the nature of the information submitted, however, EPA may use other

authorities (e.g., Sections 3004(u), 3008(h), 3013, and 7003) to obtain more definitive information on releases and exposures.

(4) The applicant should address all applicable pathways for all relevant units in their discussion of the potential for human exposure (see Section 3.0). These discussions should present conclusions concerning the potential for and possible magnitude of human exposure, as well as the major factors leading to these conclusions. Owners and operators should base their discussion on the relevant Part B information (see Appendix A) and the additional information required by the Manual. Any other information used in the discussion should be documented and sources referenced. The Agency expects that a discussion prepared as outlined in Section 3.0 can generally be accomplished in two to three pages for each pathway at each unit.

(5) The name and telephone number of the Regional contact for the exposure information requirements (see Appendix B of the Manual) should also be included.

Because EPA rather than the States will be receiving the exposure data, some EPA Regions may need to obtain the relevant Part B information from authorized States that have not routinely provided copies of the Part B. Note that the Manual also suggests that the permit applicant send copies of the EIR to the State agency involved in the permitting process.

If you have any questions or comments concerning the attached Manual, please contact Terry Grogan or Bob Kayser of my staff on FTS 382-4740.

Attachment

cc: Hazardous Waste Branch Chiefs, Regions I-X
Permits Section Chiefs, Regions I-X
Regional Exposure Information Contacts, Regions I-X
ASTSWMO

PERMIT APPLICANTS' GUIDANCE MANUAL FOR EXPOSURE INFORMATION REQUIREMENTS UNDER RCRA SECTION 3019

FINAL

Office of Solid Waste
United States Environmental Protection Agency
Washington, D.C. 20460

July 3, 1985

ACKNOWLEDGEMENTS

This manual was prepared by the Land Disposal Branch and the Permits Branch of the Office of Solid Waste. EPA personnel who were major contributors to this document include Arthur Day, Terry Grogan, Robert Kayser, and Glen Galen. Many other EPA staff served on the Exposure Information Guidance Workgroup and provided expeditious review and useful comments during the preparation of the Manual. Betsy Marcotte of Sobotka and Company also played a significant role in assisting in the preparation of this document.

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1.0 INTRODUCTION

The purpose of this document is to provide owners and operators of hazardous waste landfills and surface impoundments that are subject to permitting under the Resource Conservation and Recovery Act of 1976 (RCRA) with guidance for submitting information on the potential for public exposure to hazardous wastes, as required by Section 3019 of RCRA. This requirement was established by the 1984 Hazardous and Solid Waste Amendments to RCRA.

This document is divided into three sections with four appendices. Section 1 briefly describes the statutory requirement (including who is subject to the requirement, deadlines, and the general scope of the information which must be submitted); discusses the purposes of the exposure information process (including its relationship to RCRA permitting and the "Continuing Releases" provision); and presents general guidance on information requirements. Section 2 delineates specific information items which must be submitted to satisfy Section 3019, beyond the information already contained in the RCRA permit application. These "new" information items include data on various exposure pathways (e.g., surface water), transportation, management practices, and past or current releases.

In addition to submitting these information items, applicants must provide a narrative discussion addressing the exposure potential related to their landfill or surface impoundment unit. Section 3 provides general guidance on how applicants should structure this discussion. That Section provides examples of how specific location, design, and operating characteristics affect exposure

potential for each of the exposure pathways. Appendix A of this Manual provides a checklist which the applicant should use to cross-reference the location of information already included in the RCRA Part B permit application relevant to exposure assessment. (Such Part B information need not be resubmitted to meet Section 3019 requirements.) The checklist should also be used to indicate the location of other exposure information, not included in the Part B, which has already been submitted to the Agency. Appendix B contains a list of EPA contacts for further information. Appendix C is a list of State solid and hazardous waste agencies. Finally, Appendix D lists chemicals of special interest in waste analysis.

1.1 RCRA SECTION 3019: THE EXPOSURE INFORMATION PROVISION

Section 3019 of the Hazardous and Solid Waste Amendments of 1984 establishes a new program for the collection, reporting, and analysis of information on the potential human exposure from releases of contaminants from hazardous waste landfills and surface impoundments. Section 3019 addresses public concern that releases of hazardous waste and hazardous constituents from these units may pose a potential risk to public health. The full text of Section 3019 is included as Figure 1.

1.1.1 Applicability of the Provision

Beginning on August 8, 1985, nine months after the enactment of the Hazardous and Solid Waste Amendments, all Part B permit applications for surface impoundments and landfills must be accompanied by information that is ". . . reasonably ascertainable by the owner or operator on the potential for the public to be exposed to hazardous wastes or hazardous constituents through

releases related to the units." The owner or operator of a landfill or surface impoundment that submitted a Part B permit application before August 8, 1985, must also submit exposure information as required by Section 3019. The information must be submitted to the EPA Regional Administrator no later than August 8, 1985.

The information must be sent to EPA, since it is very unlikely that any States will receive RCRA authorization for the exposure information provision by August 8, 1985. EPA will work cooperatively with States in the review of this information. Owners and operators are encouraged to also submit a copy of the exposure information to the State RCRA permitting agency. State agencies will generally be involved in permitting the facilities subject to this requirement. In addition, States will be authorized in the future to administer the exposure information provision. Providing copies of the information to the States should, therefore, help to expedite the overall permitting process. (Appendices B and C contain lists of Regional and State agencies.)

1.1.2 Scope of the Provision

The exposure information requirement under Section 3019(a) provides that, at a minimum, the owner or operator submit information addressing the following elements:

"(1) reasonably foreseeable potential releases from both normal operations and accidents at the unit, including releases associated with transportation to or from the unit;

"(2) the potential pathways of human exposure to

hazardous wastes or constituents resulting from the releases described under paragraph (1); and

"(3) the potential magnitude and nature of the human exposure resulting from such releases."

Section 3019(b) suggests that the permitting agency is responsible for conducting a preliminary assessment of the exposure information. If the Regional Administrator or the State determine that "a landfill or surface impoundment poses a substantial potential risk to human health, due to the existence of releases of hazardous constituents, the magnitude of contamination with hazardous constituents which may be the result of a release, or the magnitude of the population exposed to such release or contamination," they may request assistance from the Agency for Toxic Substances and Disease Registry (ATSDR). The ATSDR was established by Section 104(i) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) to conduct health assessments.

Section 3019(c) allows members of the public to submit relevant information on releases, exposure, risks, or health effects to EPA, authorized States, or ATSDR.

1.1.3 Regulatory Codification

In order to add RCRA Section 3019 to the Code of Federal Regulations (CFR), EPA will in the near future publish a final rule in the Federal Register, adding paragraph (j) to existing 40 CFR Section 270.10. This new provision will basically repeat the language of Section 3019(a), regarding applicability, content, and deadlines for the exposure information requirement.

1.2 PURPOSE AND OUTLINE OF THE EXPOSURE INFORMATION PROCESS

Section 3019 suggests that exposure information will be used by EPA and authorized States in determining whether a health assessment of a landfill or surface impoundment should be conducted. EPA believes that exposure information can also serve other purposes, related to the RCRA permitting process (especially the new provision for corrective action for continuing releases). Consequently, EPA intends to use exposure information in the following ways:

- To ensure that appropriate emergency actions are taken, including alerting the public to current adverse exposures to hazardous constituents, when immediate threats are evident.
- To examine prior, current, and potential exposures and to refer cases of actual exposure for health assessments of the exposed individuals.
- To establish permit conditions necessary to ensure the prevention of situations that could present a significant risk to human health.
- To supplement the corrective action investigation and response process under the Continuing Releases provisions (RCRA Sections 3004(u) and 3008(h)).
- To support Agency actions on other related RCRA provisions (e.g., petitions for waivers from the prohibition on the land disposal of specified wastes or waivers of the surface impoundment retrofitting requirement; Alternate Concentration Limit proposals).

The following sections provide a brief outline of the exposure information process and expand upon the relationship of this process to RCRA permitting and continuing release programs.

1.2.1 General Procedures

Owners or operators must submit their completed Exposure Information Report (EIR) to the EPA Regional Office for review. A list of EPA Regional Offices and the names and telephone numbers of contacts for exposure information is presented in Appendix B. Copies of the EIR should also be sent to State agencies. A list of State solid and hazardous waste agencies is contained in Appendix C.

EPA will review the EIR for compliance with Section 3019 requirements, as outlined in this Manual. The owner or operator will be required to furnish additional information if the review indicates that the submittal is incomplete.

The regulatory response to the submitted information will vary, depending on what the information reveals. As noted earlier, a health assessment will be conducted whenever the unit poses a "substantial potential risk to public health." In some cases, the submitted information may meet the requirements outlined in this Manual but still not provide clear evidence regarding the existence of or potential for releases, much less the likely exposure and health impacts of any releases. When the information identified by this document is submitted but the situation is still unclear, EPA may use its other authorities, including RCRA Sections 3004(u), 3008(h), 3013, and 7003, to obtain more definitive indications of releases and exposures.

1.2.2 Relationship to the RCRA Permitting Process

In developing Section 3019, Congress intended to separate the exposure information provision from the facility permitting requirements in Section 3004. Although the exposure information is to accompany a permit application, it need not be in hand for a permit application to be declared complete and a permit to be issued (see 130 Congressional Record S9187; daily edition July 25, 1984).

As a matter of policy, the Agency intends to implement this provision in a manner that will have practical application in permit development whenever possible. For example, members of the public may be interested in the exposure information submitted by the permit applicant and may wish to discuss the exposure information during the permitting process. EPA and State permit writers may find the information in the EIR useful in establishing permit conditions and making permit issuance or denial decisions.

The Regional Administrator may add requirements to a facility permit to mitigate the potential for exposure, even when there is no current exposure as a result of a past or current release. For example, these permit conditions could address circumstances directly related to the design and/or operation of the facility that could contribute to a potential release and subsequent exposure in the future. The permit conditions could also address siting factors related to the location of a unit that could create the potential for a significant risk in the future. Authority for such permit conditions can be found in the RCRA facility standards (40 CFR Part 264) and the new statutory language of RCRA 3005(c)(3): permits "shall contain such terms and conditions as the Administrator (or

the State) determines necessary to protect public health and the environment."

EPA also intends that Section 3019 supplement the new Continuing Release provisions added by the Hazardous and Solid Waste Amendments of 1984 (Section 3004(u) and 3008(h)). The Continuing Release authorities will generally be used when it is unclear from existing information if a release has occurred or whether the release poses a substantial threat. The investigations conducted under Sections 3004(u) and 3008(h) will result in more complete information which can then be used in developing corrective action response measures and, in cases when actual exposure has occurred which poses a substantial potential risk to human health, pursuing a health assessment. The information contained in the EIR may also prove helpful in determining the scope of any clean-up required under Sections 3004(u) or 3008(h) (or other authorities) and the priority of such action.

1.3 GENERAL GUIDANCE ON INFORMATION REQUIREMENTS

The exposure information required under Section 3019 is to be "reasonably ascertainable by the owner or operator." EPA believes that the owner or operator of a facility who has submitted or will submit a RCRA permit application should have most of the necessary information at hand to complete the Exposure Information Report (EIR). The Part B permit application is the obvious source of much of that information, and this Manual uses the Part B as the heart of the EIR. Other information which may be available to the permit applicant beyond the Part B, such as summaries of worker exposure records, medical files, insurance

records and accident logs, will also prove valuable in preparing the EIR.

As noted earlier, the owner or operator does not have to resubmit information included in the Part B application for the purposes of the exposure information requirement. (Furthermore, the owner or operator need not resubmit other information discussed in this Manual, if that information was provided to EPA in other contexts, e.g., enforcement proceedings or other permit actions. The applicant must note the specific location and nature of that information in the EIR.) Appendix A outlines which Part B items are relevant and allows the applicant to note where in the Part B application the information is found. If the applicant has submitted information on releases or exposure from the units of concern in response to the Continuing Release provision, this should be noted in particular. This approach assumes that the applicant's Part B submittal will meet the informational requirements of 40 CFR Sections 270.14-21, as appropriate. Part B information which is incomplete or technically deficient in terms of those requirements will also generally be inadequate in terms of the Section 3019 exposure information requirements.

EPA will need some information not usually found in Part B applications in order to carry out Section 3019. Section 2 of this Manual provides a specific discussion of each of these items, which are also included as "Additional Information" items in Appendix A. Generally, this will be information which the

applicant already has onsite or in his office, or which can be readily obtained without significant expenditures of time or money. If information required in Section 2.0 is already existing (e.g., available on-site or at local firms or government agencies) and is accessible to the owner or operator (e.g., can be obtained by visiting or phoning an office), the owner or operator must submit it. Applicants must indicate in the EIR why they were unable to secure any information which is not submitted.

EPA does not expect applicants to develop major, expensive new pieces of information (e.g., new aerial photos or land use maps), because of the statutory language that exposure information be "reasonably ascertainable." However, if applicants have already developed or have easy access to more sophisticated or expensive information or analyses which are related to the requirements of Section 3019 (e.g., exposure models, actual health data from previous health assessments), such information must be identified and included in the EIR. In addition to the minimum requirements outlined in this Manual, applicants may on their own initiative develop and submit additional information and analyses.

Applicants who provide all of the exposure information and discussion described in this Manual (either in the Part B or the EIR) will generally be considered to have met the Section 3019 information submittal requirement. Depending on the nature of that information, however, EPA may need to follow up with additional inquiries, as discussed earlier in this Section.

2.0 INFORMATION REQUIREMENTS

Much of the information necessary to develop the Exposure Information Report (EIR) is available in a properly completed RCRA permit application. When submitting an EIR, the applicant should cross-reference the sections of the Part B that contain relevant exposure information. Appendix A, which contains a checklist for the relevant Part B information, must be completed by the applicant. This checklist provides a cross-reference to the location of the Part B data, so that anyone reviewing the EIR will be able to obtain easy access to the information in the permit application.

The checklist also outlines the additional information beyond the Part B that must be submitted in the EIR. This Section of the Manual provides guidance for the EIR requirements which are not generally found in Part B permit applications. These additional information requirements are briefly described in the following sections: (2.1) general information; (2.2) pathway-specific information; (2.3) transportation information; (2.4) management practices information; and, (2.5) known release information. The information items described here correspond to those in the "Additional Information" portions of Appendix A.

Please note that this Manual requires the identification on maps of a number of physical objects (e.g., drinking water wells) within specified distances from the surface impoundment or landfill unit. The distances specified were chosen to be consistent with the distances used in the CERCLA Hazardous

Waste Site Ranking System. Applicants are encouraged to provide such information on one or two maps (rather than separate maps for each requirement) to the extent possible. The scale of the map(s) must be sufficient to clearly indicate the items of concern; a scale of 1 inch to 2000 feet should be the minimum requirement, in most cases.

The owner or operator must submit the information described below, unless the information has already been provided, either in the Part B application or in response to information requests by EPA, e.g., under the Continuing Release provision (Section 3004(u)). The applicant should identify the location of the relevant information in the documents previously submitted. The Agency may have a need for additional exposure-related information to support corrective action investigations and to examine the need for case referrals for health assessments. The Agency may use other authorities (e.g., RCRA Sections 3004(u), 3008(h), 3013, and 7003) to gather any further exposure-related information.

2.1 GENERAL INFORMATION

The general information described below includes additional data beyond the Part B concerning the wastes handled, the area around the facility, inspection and compliance records, and insurance information. Applicants must provide:

- Any health or risk assessment information and reports on the units. This includes information prepared in relation to liability insurance or for any other purpose. Many insurance underwriters perform an examination of the sources of releases, transport pathways, and potential receptors in order to identify high risk sites. Any

insurance claims and settlements relating to the operation of the units of concern must also be summarized.

- Zoning and land use maps of the area surrounding the site, indicating the current and potential zoning and land use activities. Such maps are usually available from local government agencies. These maps should, at a minimum, extend outward from the unit for a radius of four miles.
- Recent, existing aerial photographs of the facility area. These are available from local firms engaged in regional planning, local government agencies, State agencies (highway department, agricultural or forestry department), USGS, or the U.S. Soil Conservation Service. The owner/operator should include any recent stereophotos, if available.
- Identify the types of existing waste analyses, not already submitted in the Part B, that are representative of wastes routinely accepted (both in the past and currently). Summarize the results of the analyses in tabular form, including the presence and approximate concentration ranges of constituents. Examples of such information include analyses of chemical constituents in the waste streams, landfill leachate, or impoundment contents. The analyses could be detailed chemical analyses, such as a scan for the priority pollutants identified under the Clean Water Act, or more limited analyses, such as generator data sheets or analyses for constituents known to be in the waste streams. These analyses also include additional analyses that may have been performed in the course of preparing any delisting petitions, NPDES permit discharge analyses, or waste/leachate liner compatability testing.

In most cases, EPA recommends that the applicant provide a representative analysis of the ten largest waste streams (by volume) handled by the facility as well as of the wastes contained in surface impoundments and any leachate from landfill leachate collection systems. (If such analysis is submitted in response to the previous paragraph, that will satisfy this recommendation.) This analysis should determine the presence and concentrations (or range of concentrations) of hazardous constituents. Section 3019 is concerned with potential public exposure to all hazardous wastes or hazardous constituents. Given the time available, however, we recommend that this analysis be conducted for the constituents listed in Appendix D of this Manual. Representative samples of landfill leachate and surface impoundment wastes may be obtained by compositing samples from the same unit. (EPA publication SW-846--Test Methods for Evaluating Solid Waste should be consulted for recommended sampling and analysis procedures.)

In lieu of the recommended waste analysis, applicants may choose to submit a discussion of how existing waste stream, impoundment or leachate analyses adequately identify and quantify the hazardous constituents contained in the unit and why further analysis is not necessary. The applicant may base this discussion on the existing waste analysis, knowledge of the process generating the waste, and the disposal practices at the unit. For example, an engineering analysis of the waste stream process, information provided by the generator, and a site audit of the generator, may allow the applicant to characterize the waste by analyzing for a limited number of hazardous constituents. If the applicant can further

demonstrate that multiple units accept nearly identical wastes, he may choose one unit to be representative of all like units.

° A current estimate of the annual volume or amount of wastes received at each unit. This information should be available in response to RCRA manifest and record keeping requirements (Part 264, Subpart E). In addition, provide a description of any pretreatment process used for these units. If this information has already been included in the Part B, indicate its location.

° Identify which Federal, State and local environmental and health agencies conduct inspections and maintain reports on the operation of the landfill or surface impoundment. The applicant must indicate where complete copies of these reports are available (e.g., applicant's files, specific office of the relevant agency). Summarize past compliance with any permits, regulations, or standards relating to the unit, including dates and brief descriptions of any violations. The applicant must fully describe any major violations of those programs and resulting releases to any pathway as outlined in Section 2.5. Examples of the types of records to be identified or summarized are:

- reports on occupational health and safety resulting from inspections by OSHA (Occupational Safety and Health Administration) or similar State or local agencies;
- compliance records with NPDES (National Pollution Discharge Elimination System) and other surface water point source discharge permits;

- compliance records for applicable Federal or State air quality standards and any permits controlling air emissions;

- evaluation records from the Open Dump Inventory (if the unit failed the subsurface gas criteria, describe monitoring results and any remedial actions);

- records of notification to the National Response Center or other government authorities concerning any release of hazardous substances that exceeded or equaled the Reportable Quantities established under CERCLA;

- accident reports submitted to the Federal Department of Transportation (or similar State agency) describing any release of hazardous waste or constituent; and

- Fire Marshal reports required by local fire departments.

2.2 PATHWAY-SPECIFIC INFORMATION

Human exposure to hazardous waste or waste constituent releases from the facility may occur or be detected through a number of potential exposure pathways. Owners and operators must characterize these pathways in order to determine the potential for exposure to hazardous waste releases (See Section 3). The statute mentions the following potential exposure pathways: ground water, surface water, air, and food-chain contamination. Subsurface gas has also been added in the Manual as a unique type of air pathway, and the indirect path of food-chain contamination has been incorporated into the pathways which directly receive the release. Soil contamination was included in the Manual as a pathway due to the possible contamination <u>via</u> soil of other pathways (i.e., through crops, run-off to surface water, and release of particulates to air), as well as the potential for direct exposure.

The additional pathway information that must be submitted in the EIR is described below, in sections for each of the pathways.

2.2.1 Ground Water

- Provide an existing map showing the location of all known ground water withdrawal wells within three miles of the unit. Such maps may be available from local health agencies responsible for regulating ground water use. The number and location of licensed drinking water wells within the same area must be provided or estimated, based on the available data.

- Provide a narrative discussion describing general ground-water usage patterns within the three mile radius, including any known uses of groundwater for commercial food preparation, or agricultural irrigation. The discussion must identify, if known, which aquifers are used, as well as any nearby high use pumping operations that may alter ground-water flow patterns.

- If ground-water studies of the area have been done, provide any map(s) showing the location of regional ground-water recharge and discharge areas. These maps are usually available from USGS publications.

- Provide net precipitation (precipitation minus evaporation), using net seasonal rainfall data, if available. If not available, calculate net precipation by substracting the mean annual evaporation for the region from the normal annual precipitation. Such data are available from standard reference documents, e.g., The Climatic Atlas of the United States, U.S. Department of Commerce.

2.2.2 Surface Water

- Provide an existing map showing the location of all surface water bodies within a three mile radius of the unit (e.g., USGS or similar topographical map). Identify on the map downstream drinking water intake sources, estimate the populations served, and note the locations of other intakes for known major industrial or commercial uses. Provide a narrative discussion of general surface-water use within the three mile radius, including any other known major uses, such as commercial fishing, recreational, and agricultural uses. Such information should be available from water resource and planning agencies.

- Provide velocities of streams and rivers (including mean, high, and low flow) passing through the property and within 1000 feet of the property. Possible sources include the U.S. Army Corps of Engineers, USGS, and State water resource agencies.

- Describe any monitoring system used to monitor surface-water quality, and provide a summary of resulting surface-water quality data.

2.2.3 Air

- Describe any air monitoring system around the unit, and provide a summary of resulting air quality data.

- Estimate the population within a four mile radius of the unit. Information on this subject should be available from local planning agencies.

2.2.4 Subsurface Gas

- Identify the past disposal of any municipal-type wastes in the unit; specify the types of waste and provide approximate quantities and dates of disposal, if known. (Such wastes include: incinerator, composting, or resource recovery residues; septic tank wastes; municipal waste water treatment sludges; and normal domestic waste and garbage.)

- Indicate on a map any known locations of underground conduits inside the property boundary and within 1000 feet of the boundary. Possible sources of information include local utility companies.

- Describe any monitoring, recovery or control systems for subsurface gas release and provide a summary of resulting data.

2.2.5 Soil

- If soil sampling for contamination has been done around the unit, the applicant must identify the location of the sampling sites and any soil contamination on a map. Analytical results must be summarized, including chemicals analyzed for, chemicals found, and levels measured.

2.3 TRANSPORTATION INFORMATION

Accidents or leaks during the transportation of wastes at the facility site may result in human exposure. The applicant

must submit information concerning transport on-site and in the immediate vicinity (e.g., on access roads), as defined below. Part B requirements also require submission of traffic documentation; if the applicant has previously submitted all or portions of the information requirements given below, reference to their location in the Part B application will be accepted.

- Provide general descriptions (including capacity) of the types of vehicles and containers used to transport hazardous waste to and within the facility.

- Identify normal transport routes for hazardous waste into the site and within a distance of one mile of the facility entries.

- Describe procedures for clean-up of spills or leaks resulting from the transport of waste on-site (or in the immediate vicinity of the facility) and unloading/loading activities on-site.

2.4 MANAGEMENT PRACTICES INFORMATION

A potential cause of releases and human exposure to hazardous wastes is improper management practices at landfills and surface impoundments. Information on worker injuries, accidents, and illnesses related to the hazardous waste units may be used to help identify those facilities with questionable management practices and, hence, with potential for releases. Such information may also serve as an indicator that a release has already occurred to one of the direct exposure pathways. Therefore, the following

information must be submitted.

- Summarize existing worker illness, accident, or injury reports and logs related to the operation of the surface impoundment or landfill. This includes a summary of Worker's Compensation claims filed or hospitalization records documenting worker illness, accidents, or injuries related to operation of the unit.

2.5 KNOWN RELEASE INFORMATION

Unless information on known releases (including those releases violating existing permits or standards as noted in Section 2.1) has been submitted previously in the Part B application, or in response to requests under the Continuing Release provision (Section 3004(u)), the applicant must provide a description of the nature and magnitude of any known release, including the following:

- existing evidence identifying the release, including a summary of any relevant monitoring data;
- the pathway and extent of any migration of the released waste or constituent (if characterized);
- any corrective action taken, and the effectiveness of such measures (if known); and
- the extent and severity of impact of any known public exposures resulting from releases of waste or consituents. Identify and summarize any studies (prepared by the applicant, other government agencies, the public, or others) that characterize the impact of the exposures.

While the appropriate sections of the Part B application should adequately describe most ground-water releases, the applicant must provide any additional information available. This additional information includes any analytical data for wells not otherwise reported to EPA indicating a release, and information concerning any affected public or private water supplies and estimates of the populations served. Also, any known food-chain contamination due to agricultural or food preparation uses of contaminated water must be described.

Surface water releases that must be described include those resulting from overtopping of impoundments, uncontrolled run-off from active landfills, and sediment transport or wash-out due to erosion, run-off, or flooding. Evidence may include visual sightings and fish kills, as well as monitoring data. Information on known instances of human exposure must also include any known food-chain contamination (e.g., fish bioaccumulation).

Evidence of vapor or particulate releases to air primarily consists of air monitoring data, although visible emissions, odor complaints by the public, and documented air impacts on workers may also serve as indicators. The most obvious indications of subsurface gas release, in addition to monitoring data, are fire or explosion related to methane migration. Releases to soil are defined through any soil sampling that has been done (see Section 2.2.4), although stressed vegatation and/or soil discoloration may also serve as indicators of possible release to the soil. Any known food chain contamination due to agricultural use of the contaminated soil must be described.

Transportation-related releases are associated with accidents occuring on-site or within one mile of facility entries. While transport is normally associated with truck or rail hauling, other transportation methods, such as pipelines and barges, must also be included in reporting of accidents and releases.

3.0 EXPOSURE POTENTIAL OF THE UNIT

3.1 Introduction

Owners or operators of hazardous waste landfill and surface impoundment units subject to Section 3019 must provide the exposure-related information outlined in Appendix A and Section 2.0 of this Manual. In addition, they must prepare a narrative discussion based on that information on the potential for the public to be exposed to hazardous wastes or hazardous constituents through releases related to the unit. This section describes the approach owners or operators should use to describe the potential for human exposure via each of the pathways identified in Section 2.0 for each unit of concern.

For each unit, for each pathway, the owner or operator should draw conclusions regarding the potential for and possible magnitude of human exposure from both normal operations and accidents at or near the unit(s) of concern. The owner or operator should discuss both the potential for direct human exposure and the potential for human exposure from the contamination of food chain crops. In particular, the applicant should describe site-specific location, design and operating factors that mitigate the potential for releases (e.g., liners, leachate collection systems, etc.) as well as factors that increase the potential for exposure (e.g., high ground water flow rates, downgradient drinking water wells, etc.).

The Agency expects that a properly prepared discussion of exposure potential as outlined in this Section can generally be accomplished in 2 to 3 pages for each of the pathways at each of the relevant units. These discussions should present conclusions

and the major factors which lead to the conclusions, but detailed analyses are not required. Owners or operators should base their discussion and conclusions on relevant Part B information (see Appendix A) and the information requested in Section 2.0; Part B information need not be resubmitted or repeated in detail. Owners or operators can use additional information they may have to prepare these descriptions; they should document or reference the sources of these data.

3.2 Potential for Human Exposure Via the Ground Water Pathway

The owner or operator should describe how the unit's location affects the potential for and possible magnitude of human exposure from releases to ground water. For example, the potential magnitude of human exposure is increased if the unit is located in an area characterized by high rates of ground-water flow, a shallow aquifer, high net precipitation, and porous soils, or if the unit is located upgradient from a public drinking water well system.

The owner or operator should then describe the design and operating features that affect the potential for releases and the magnitude of these releases. For example, double synthetic liner containment systems coupled with leachate collection systems and run-on/run-off control systems minimize the potential for releases from a unit. Correctly placed and screened monitoring wells can pick up releases that do occur and enable the owner or operator to take corrective action before human exposure occurs. Leak detection procedures for surface impoundments, such as

routine analysis of leachate, will also allow the early detection of releases.

3.3 Potential for Human Exposure Via the Surface Water Pathway

The owner or operator should describe how the unit's location affects the potential for human exposure from releases to surface water. For example, the potential magnitude of human exposure is increased if a unit is located adjacent to surface water or upstream from drinking water intakes. Units located next to stream segments characterized by high flow rates and dilution capacity may have a lower exposure potential than units located along stream segments that are stagnant.

Certain design and operating features affect the potential for and the magnitude of surface water releases. For example, units with secondary containment systems, runoff control systems, dikes, etc., are less likely to have releases than units without such containment and runoff control systems. Automatic cut-off systems and overflow alarms also decrease the potential for releases from surface impoundments. The owner or operator should describe how the design and operating characteristics of operating surface impoundments and landfills affect the potential for releases that threaten human health. The owner or operator should also describe the effectiveness of the facility design and emergency procedures to minimize the effects of floods or severe storm events.

3.4 Potential for Human Exposure Via the Air Pathway

The owner or operator should describe how the unit's location affects the potential for human exposure from air releases. For

example, the potential magnitude of human exposure from air releases is much higher if the unit is located in a densely populated area rather than a relatively unpopulated rural area. Units located in areas characterized by frequent inversions or limited dispersion also have a greater potential for exposure than units where releases are quickly dispersed. Temperature, wind speed, precipitation and topography all affect the ambient atmosphere's ability to disperse air releases.

The design and operation of the unit will affect the potential for and the magnitude of releases. The applicant should describe how the facility's design and operation affect the potential for release of air emissions which could threaten human health and the environment. For example, the applicant should briefly describe any venting systems for subsurface gas, the design of any caps on the unit, any dust suppression or particulate controls, and any disposal by bulk evaporation.

The owner or operator should also describe any waste characteristics indicative of potential for releases to air, such as the incompatibility, reactivity, or ignitability of the waste, as well as the volatility of waste constituents. The applicant should briefly outline special handling, treatment, or mixing procedures used to ensure that violent reactions, fires, explosions, and extensive evaporation of volatile constituents do not occur.

3.5 Potential for Human Exposure From Subsurface Gas Releases

The owner or operator should describe how the unit's location affects the potential for human exposure from subsurface gas releases. For example, the potential magnitude of human

exposure is affected by the existence of barriers to or conduits for subsurface gas migration in the vicinity of the unit. Units located far from buildings or other structures that could trap the methane are much less likely to have releases with significant exposure potential.

The applicant should describe how the facility design and operation affects the potential for releases of subsurface gas. For example, units that do not contain municipal waste are less likely to have such releases than are co-disposal units. Also, operating surface impoundments have limited potential for exposures from subsurface gas releases because of their large exposed surface area. Any gas control measures should be described, including trenches, cut-off walls, vents, and recovery systems.

3.6 Potential for Human Exposure From Releases to Soil

The owner or operator should describe how the unit's location, design, and operating characteristics affect the potential for and possible magnitude of human exposure from releases to soil. The potential for human exposure due to off-site transport of contaminated soil should be described. For example, contaminated soil may reach surface water through run-off, and wind dispersion may result in off-site transport through the air pathway. Direct human exposure to contaminated soil on-site is also possible, and the applicant should describe operating features affecting such exposures, e.g., on-site spill clean-up procedures, as well as security procedures used to limit public access to the unit and

any nearby contaminated area. If food crops are grown in, or adjacent to, contaminated soil, the applicant should discuss the potential for food-chain contamination.

3.7 Potential for Human Exposure From Transportation-Related Releases

The owner or operator should describe how methods and routes of transportation of waste on-site and in the immediate vicinity of the facility affect the potential for human exposure from releases related to transportation accidents or leaks from vehicles used to transport the waste. For example, the potential magnitude of releases is increased when transportation routes move significant quantities of waste through a highly populated area to an off-site disposal facility, as opposed to transportation routes through thinly populated rural areas or routes where the waste remains on-site from generation to disposal. Similarly, accident and spill prevention programs and procedures are likely to mitigate the potential for human exposure from transportation-related releases. These are the types of factors that should be described in this section of the EIR.

3.8 Potential for Human Exposure From Worker-Management Practices

The information submitted by the applicant concerning management practices consists of data on worker injuries, accidents, and illnesses related to the operation of the landfill or surface impoundment. The discussion in this section should focus on the nature and frequency of such cases, and any patterns of occurrence indicating that releases from the unit may have occurred in the past (or may be occurring). The applicant should analyze the worker data

and discuss the potential for off-site migration and public exposure resulting from any releases related to worker-management practices.

The owner or operator should briefly describe training programs in place for the workers that ensure the safe handling of wastes and minimize the potential for releases from normal operations of the unit. The facility should have developed contingency and other emergency plans that are designed to minimize the potential for human exposure from accidental releases at the facility, and these should be briefly described as well. Any steps instituted to correct any past problems evidenced by the worker data should also be outlined.

APPENDIX A. INFORMATION REQUIREMENTS CHECKLIST

1. General Information

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(b)(1)	General description of facility	
270.14(b)(2) and (3)	Chemical and physical analyses of wastes	
270.14(b)(4)	Access control and security description of active portion	
270.14(b)(5), 270.17(d), and 270.21(d)	General inspection schedule and procedures	
270.14(b)(6)	Preparedness and prevention documentation	
270.14(b)(7)	Contingency plan	
270.14(b)(8)	Preventive procedures	
270.14(b)(11) (i) and (ii)	Facility location information	
270.14(b)(13)	Closure plan	
270.14(b)(13)	Post-closure care plan	
270.14(b)(17)	Documentation of insurance	

APPENDIX A. INFORMATION REQUIREMENTS CHECKLIST

1. General Information (continued)

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application (continued)	
270.14(b)(19)	Topographic map (site plotted on USGS quadrangle maps)	
270.21(a) and 270.17(a)	List of wastes placed or to be placed in each unit	
	Additional Information	
	Existing risk assessment reports and information, including liability insurance analyses, claims, and settlements	
	Land use and zoning map(s) for an area of 4 miles around the unit	
	Existing aerial photographs of the facility	
	Identify and summarize any waste analysis data not already submitted; provide additional data as discussed in text	
	Current estimate of annual amount of waste received and description of any pretreatment process used	
	Identification of any Federal, State, or local inspection or compliance records related to environmental and health programs; include descriptions of any major violations	

APPENDIX A. INFORMATION REQUIREMENTS CHECKLIST

2. Ground Water Pathway

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(c)(1)	Interim status ground-water monitoring results	
270.14(c)(2)	Identification of uppermost aquifer, including flow rate and direction	
270.14(c)(3) and 270.14(b)(19)	Topographic maps related to ground-water protection (well location, water table elevation contours, etc.)	
270.14(c)(4) (i) and (ii)	Description of existing contamination	
270.14(c)(5)	Detailed plans for ground-water monitoring program	
270.14(c)(6)	Description of detection monitoring program (if applicable)	
270.14(c)(7) and (c)(7)(ii)	Description of compliance monitoring program and characterization of contaminated ground water (if applicable)	
270.14(c)(7)(iv)	ACL demonstration (if any)	
270.14(c)(8)	Corrective action program (if applicable)	
270.17(b)(1) 270.21(b)(1)	Description of liner and leachate collection systems (if applicable)	

2. Ground-Water Pathway (Continued)

Description	
Additional Information	
Existing map showing location of all known wells within three miles ; number and location of drinking water wells	
Discussion of ground-water uses within three miles of unit	
Regional map showing areas of ground-water recharge and discharge	
Net precipitation using net seasonal rainfall or other available data	
Unless otherwise reported to EPA, available well data indicating a release, and information on any affected public or private water supplies, including populations served	
Any known food chain contamination due to prior release from the unit to ground water	

3. Surface Water Pathway

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(b)(11) (iii) thru (v)	Location information related to 100 yr flood plain including variance demonstrations	
270.21(b)(2)	System for control of run-on from each peak discharge of 25 yr storm	
270.21(b)(3)	System for control of run-off from 24 hr, 25 yr storm	
270.17(b)(2)	Procedures/equipment to prevent overtopping	
270.17(b)(3)	Structural integrity of dikes	
	Additional Information	
	Discussion of surface-water uses within three miles of the unit, including a map showing the location of all surface-water bodies and downstream drinking water intakes	
	Velocities of streams and rivers passing through and adjacent to the property	

3. Surface Water Pathway (Continued)

Reg. Cite	Description	
	Additional Information (continued)	
	Description of any system used to monitor surface-water quality, and a summary of the data	
	Description of known releases to surface water; the extent of contamination; remedial action, if any; and if known, severity of impact.	
	Any known food-chain contamination resulting from prior release from the unit to surface water	

4. Air Pathway

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(b)(9), 270.21(f) and (g), 270.21(h) and (i)	Documentation of procedures to prevent accidental ignition or reaction	
270.21(b)(5)	Plans to control wind dispersal of particulate matter at landfills	
270.14(b)(19)(v)	A wind rose showing prevailing windspeed and direction	
	Additional Information	
	Summary of air monitoring data and a description of current monitoring system, if any	
	Population within a four mile radius of the unit	
	Describe any known releases to air; the extent of contamination; remedial action, if any; and severity of impact, if known	

5. Subsurface Gas Pathway

Req. Cite	Description	Location in RCRA Application
	Information in Part B Application	
	None in addition to General Information Requirements	----------
	Additional Information	
	Any past disposal of municipal-type wastes in the unit; approximate quantities and dates of disposal, if known	
	Map location of any underground conduits within the site and known underground conduits within 1000 feet of property boundary	
	Descriptions of any monitoring or control mechanisms for subsurface gas release; summmarize resulting data	
	Description of any known releases; extent of contamination; remedial action taken, if any; and the severity of impact, if known	

6. Contaminated Soil Pathway

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
	None in addition to General Information Requirements	---------
	Additional Information	
	If soil sampling has been done, a map showing areas of soil contamination, and a summary of analytical results	
	Description of the types of major releases that resulted in soil contamination, and any clean-up action	
	Any known food-chain contamination resulting from the use of contaminated soils for raising crops	

7. Transportation Information

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(b)(10)	Traffic pattern, volume, and controls; access road characteristics.	
	Additional Information	
	Description of the types and capacities of vehicles used to transport waste	
	Identification of normal transport routes for hazardous waste into the site and within one mile of the facility entries	
	Description of procedures for clean-up of transportation-related spills or leaks	
	Descriptions of any transportation accidents releasing hazardous wastes on-site, or in the immediate vicinity	

APPENDIX A. INFORMATION REQUIREMENTS CHECKLIST

7. Transportation Information

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(b)(10)	Traffic pattern, volume, and controls; access road characteristics.	
	Additional Information	
	Description of the types and capacities of vehicles used to transport waste	
	Identification of normal transport routes for hazardous waste into the site and within one mile of the facility entries	
	Description of procedures for clean-up of transportation-related spills or leaks	
	Descriptions of any transportation accidents releasing hazardous wastes on-site, or in the immediate vicinity	

APPENDIX A. INFORMATION REQUIREMENTS CHECKLIST

8. Management Practices Information

Reg. Cite	Description	Location in RCRA Permit Application
	Information in Part B Application	
270.14(b)(12) 264.16	Outline of programs to train employees to safely operate and maintain facility, including emergency response activities	
	Additional Information	
	Summary of existing records on worker illness or injury, related to the operation of the unit; include summaries of Workman's Compensation claims, or hospital records	

APPENDIX B

Contacts at EPA Regional Offices

Region	Contact
Region I	Gerrard Sotolongo Waste Management Division State Waste Programs Branch CN/RI Waste Programs Section U.S. EPA - Region I John F. Kennedy Building Room 1900 Boston, MA 02203 (617) 223-1724
Region II	Diane Buxbaum Technical Support Section Room 1000 2AW-SW U.S. EPA - Region II 26 Federal Plaza New York, NY 10278 (212) 264-2724
Region III	Sam Rotenberg RCRA Support Section U.S. EPA - Region III 841 Chestnut Street Philadelphia, PA 19107 (215) 597-2842
Region IV	Doug McCurry, Chief Waste Engineering Section U.S. EPA - Region IV 345 Courtland Street, N.E. Atlanta, GA 30308 (404) 881-3067
Region V	Edith Ardiente, Chief Technical Programs Section (5 AHMF) U.S. EPA - Region V 230 S. Dearborn Street Chicago, IL 60604 (312) 886-6135
Region VI	Mark deLorimer Technical Section (6 AW-HT) U.S. EPA - Region VI 1201 Elm Street First International Building Dallas, TX 75270 (214) 767-2663

APPENDIX B

Region VII	Luetta Flournoy Permits Section RCRA Branch U.S. EPA - Region VII 726 Minnesota Avenue Kansas City, KS 66101 (816) 374-6531
Region VIII	Mike Gansecki Hazardous Waste Management Branch RCRA Permits Section 8HWM-WM U.S. EPA Region VIII 999 18th Street Suite 1300 Denver, CO 80202-2413 (303) 293-1662
Region IX	Barbara Gross RCRA Branch Alternative Technology Section (T-2-3) U.S. EPA - Region IX 215 Fremont Street San Francisco, CA 94105 (415) 974-7101
	Keven Wong RCRA Branch Alternative Technology Section (T-2-3) U.S. EPA - Region IX 215 Fremont Street San Francisco, CA 94105 (415) 974-7481
Region X	Jeff Webb Hazardous Waste Division MS-533 U.S. EPA - Region X 1200 Sixth Avenue Seattle, WA 98101 (206) 442-1099

Appendix C
STATE SOLID AND HAZARDOUS WASTE AGENCIES
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Office of Solid Waste
June 10, 1985

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NOTE TO APPENDIX D

The chemicals listed in Appendix D on the folowing pages are the priority toxic pollutants (as identified by EPA for use in wastewater discharge analysis) that are designated as hazardous constituents under RCRA (40 CFR Part 261). In addition to determination of the substances given in Appendix D, tentative identifications should be attempted for the ten organic compounds not listed in this Appendix that are detected at the highest apparent concentrations by gas chromatographic methods. Applicants should determine if the ten identified compounds are listed in Appendix VIII of 40 CFR Part 261. Identifications may be based on a search of mass spectral libraries if GC/MS methods are used, and concentrations may be approximated by comparison of the compounds' response to a closely eluted standard.

APPENDIX D. LIST OF CHEMICALS TO BE DETERMINED IN LANDFILL LEACHATE, SURFACE IMPOUNDMENT CONTENTS, OR ACCEPTED WASTES

	Compound Name	Chemical Abstract Service Number
Metals and Cyanide	Antimony, Total	7440-36-0
	Arsenic, Total	7440-38-2
	Beryllium, Total	7440-41-7
	Cadmium, Total	7440-43-9
	Chromium, Total	7440-47-3
	Copper, Total	7440-50-8
	Lead, Total	7439-92-1
	Mercury, Total	7439-97-6
	Nickel, Total	7440-02-0
	Selenium, Total	7782-49-2
	Silver, Total	7440-22-4
	Thallium, Total	7440-28-0
	Zinc, Total	7440-66-6
	Cyanide, Total	57-12-5
Dioxin	2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD)	1764-01-6
Volatile Compounds	Acrolein	107-02-8
	Acrylonitrile	107-13-1
	Benzene	71-43-2
	Bromoform	75-25-2
	Carbon Tetrachloride	56-23-5
	Chlorobenzene	108-90-7

APPENDIX D. (CONTINUED)

	Compound Name	Chemical Abstract Service Number
Volatile Compounds (cont.)	Chloroethane	75-00-3
	2-Chloroethylvinyl Ether	110-75-8
	Chloroform	67-66-3
	1,1-Dichloroethane	75-34-3
	1,2-Dichloroethane	107-06-2
	1,1-Dichloroethylene	75-35-4
	1,2-Dichloropropane	78-87-5
	1,3-Dichloropropylene	542-75-6
	Ethylbenzene	100-41-4
	Methyl Bromide	74-83-9
	Methyl Chloride	74-87-3
	Methylene Chloride	75-09-2
	1,1,2,2-Tetrachloroethane	79-34-5
	Tetrachloroethylene	127-18-4
	Toluene	108-88-3
	1,2-Trans-dichloroethylene	156-60-5
	1,1,1-Trichloroethane	71-55-6
	1,1,2 Trichloroethane	79-00-5
	Trichloroethylene	79-01-6
	Vinyl Chloride	75-01-4

APPENDIX D. (CONTINUED)

	Compound Name	Chemical Abstract Service Number
Acid Compounds	2-Chlorophenol	95-57-8
	2,4-Dichlorophenol	120-83-2
	2,4-Dimethylphenol	105-67-9
	4,6-Dinitro-o-cresol	534-52-1
	2,4-Dinitrophenol	51-28-5
	2-Nitrophenol	88-75-5
	4-Nitrophenol	100-02-7
	p-Chloro-m-cresol	59-50-7
	Pentachlorophenol	87-86-5
	Phenol	108-95-2
	2,4,6-Trichlorophenol	88-06-2
Base/Neutral Compounds	Acenaphthene	83-32-9
	Acenaphthylene	208-96-8
	Anthracene	120-12-7
	Benzidine	92-87-5
	Benzo[a]anthracene	56-55-3
	Benzo[a]pyrene	50-32-8
	Benzo[b]fluoranthene	205-99-2
	Benzo[ghi]perylene	191-24-2
	Benzo[k]fluoranthene	207-08-9
	Bis(2-chloroethoxy) Methane	111-91-1
	Bis(2-chloroethyl) Ether	111-44-4

APPENDIX D. (CONTINUED)

	Compound Name	Chemical Abstract Service Number
Base/Neutral Compounds (cont.)	Bis(2-chloroisopropyl) Ether	102-60-1
	Bis(2-ethylhexyl) Phthalate	117-81-7
	4-Bromophenyl Phenyl Ether	101-55-3
	Butyl Benzyl Phthalate	85-68-7
	2-Chloronaphthalene	91-58-7
	4-Chlorophenyl Phenyl Ether	7005-72-3
	Chrysene	218-01-9
	Dibenzo[a,h]anthracene	53-70-3
	1,2-Dichlorobenzene	95-50-1
	1,3-Dichlorobenzene	541-73-1
	1,4-Dichlorobenzene	106-46-71
	3,3'-Dichlorobenzidine	91-94-1
	Diethyl Phthalate	84-66-2
	Dimethyl Phthalate	131-11-3
	Di-n-Butyl Phthalate	84-74-2
	2,4-Dinitrotoluene	121-14-2
	2,6-Dinitrotoluene	606-20-2
	Di-n-Octyl Phthalate	117-84-0
	1,2-Diphenylhydrazine (as Azobenzene)	122-66-7
	Fluoranthene	206-44-0
	Flourene	86-73-7
	Hexachlorobenzene	118-74-1

APPENDIX D. (CONTINUED)

	Compound Name	Chemical Abstract Service Number
Base/Neutral Compounds (cont.)	Hexachlorobutadiene	87-68-3
	Hexachlorocyclopentadiene	77-47-4
	Hexachloroethane	67-72-1
	Indeno[1,2,3-cd]pyrene	193-39-5
	Isophorone	78-59-1
	Naphthalene	91-20-3
	Nitrobenzene	98-95-3
	N-Nitrosodimethylamine	62-75-9
	N-Nitrosodi-N-propylamine	621-64-7
	N-Nitrosodiphenylamine	86-30-6
	Phenanthrene	85-01-8
	Pyrene	129-00-0
	1,2,4-Trichlorobenzene	120-82-1
Pesticides	Aldrin	309-00-2
	alpha-BHC	319-84-6
	beta-BHC	319-85-7
	gamma-BHC	58-89-9
	delta-BHC (Lindane)	319-86-8
	Chlordane	57-74-9
	4,4'-DDT	50-29-3
	4,4'-DDE	72-55-9
	4,4'-DDD	72-54-8
	Dieldrin	60-57-1

APPENDIX D. (CONTINUED)

	Compound Name	Chemical Abstract Service Number
Pesticides (cont.)	alpha-Endosulfan	115-29-7
	beta-Endosulfan	115-29-7
	Endosulfan Sulfate	1031-07-8
	Endrin	72-20-8
	Endrin Aldehyde	7421-93-4
	Heptachlor	76-44-8
	Heptachlor Epoxide	1024-57-3
	PCB-1242	53469-21-9
	PCB-1254	11097-69-1
	PCB-1221	11104-28-2
	PCB-1232	11141-16-5
	PCB-1248	12672-29-6
	PCB-1260	11096-82-5
	PCB-1016	12674-11-2
	Toxaphene	8001-35-2